

Substitute_SequenceListing

<110> SUNG, Young Chul
 YOUN, Jin-won
 YANG, Se-Hwan
 PARK, Su-Hwan
 LEE, Chang Geun

<120> A vaccine enhancing the protective immunity to Hepatitis C virus
 using plasmid DNA and recombinant adenovirus

<130> 428.1049

<140> 10/528,644
 <141> 2005-03-18

<150> KR 2002-58712
 <151> 2002-09-27

<150> KR 2002-68496
 <151> 2002-11-06

<160> 184

<170> PatentIn version 3.5

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<400> 55

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 <223> HCV53-72

<400> 56

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Substitute_SequenceListing

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<210> 57
<211> 20
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<400> 57
Gln Pro Ile Pro Lys Ala Arg Gln Pro Glu Gly Arg Thr Trp Ala Gln
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Pro Gly Tyr Pro
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<210> 58
<211> 20
<212> PRT
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<400> 58
Gly Arg Thr Trp Ala Gln Pro Gly Tyr Pro Trp Pro Leu Tyr Gly Asn
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Glu Gly Leu Gly
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<210> 59
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<212> PRT
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<400> 59
Trp Pro Leu Tyr Gly Asn Glu Gly Leu Gly Trp Ala Gly Trp Leu Leu
1          5          10          15

Ser Pro Arg Gly
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<210> 60
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Substitute_SequenceListing

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<220>
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<400> 60

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Pro Thr Asp Pro
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<210> 61
<211> 20
<212> PRT
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<400> 61

Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro Arg Arg Arg Ser Arg Asn
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Leu Gly Lys Val
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<210> 62
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<212> PRT
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<220>
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<400> 62

Arg Arg Arg Ser Arg Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys
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Gly Phe Ala Asp
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<210> 63
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<212> PRT
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<220>
<223> HCV123-142

<400> 63

Ile Asp Thr Leu Thr Cys Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro
Page 20

Substitute_SequenceListing

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Leu Val Gly Ala
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<210> 64
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<212> PRT
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<220>
<223> HCV133-152

<400> 64

Leu Met Gly Tyr Ile Pro Leu Val Gly Ala Pro Leu Gly Gly Val Ala
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Arg Ala Leu Ala
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<210> 65
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<212> PRT
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<223> HCV143-162

<400> 65

Pro Leu Gly Gly Val Ala Arg Ala Leu Ala His Gly Val Arg Leu Leu
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Glu Asp Gly Val
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<210> 66
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<212> PRT
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<220>
<223> HCV153-172

<400> 66

His Gly Val Arg Leu Leu Glu Asp Gly Val Asn Tyr Ala Thr Gly Asn
1 5 10 15

Leu Pro Gly Cys
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<210> 67
<211> 20

Substitute_SequenceListing

<212> PRT
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 <223> HCV384-403
 <400> 67
 Ser Thr Arg Val Thr Gly Gly Thr Glu Gly Arg Thr Thr Asn Arg Phe
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Val Ser Ile Phe
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<210> 68
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 <212> PRT
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 <223> HCV404-423

<400> 68

Ala Ser Gly Pro Ser Gln Lys Ile Gln Leu Val Asn Asn Asn Gly Ser
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Trp His Ile Asn
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<210> 69
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 <212> PRT
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<400> 69

Val Asn Asn Asn Gly Ser Trp His Ile Asn Arg Thr Ala Leu Asn Cys
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Asn Asp Ser Leu
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<210> 70
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 <212> PRT
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<220>
 <223> HCV424-443

<400> 70

Arg Thr Ala Leu Asn Cys Asn Asp Ser Leu Ser Ser Gly Phe Ile Ala
 Page 22

Substitute_SequenceListing

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Ala Leu Phe Tyr
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<210> 71
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV434-453

<400> 71

Ser Ser Gly Phe Ile Ala Ala Leu Phe Tyr Thr His Lys Phe Asp Ser
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Ser Gly Cys Pro
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<210> 72
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV444-463

<400> 72

Thr His Lys Phe Asp Ser Ser Gly Cys Pro Glu Arg Met Ala Ser Cys
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Arg Pro Ile Asp
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<210> 73
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV454-473

<400> 73

Glu Arg Met Ala Ser Cys Arg Pro Ile Asp Lys Phe Ala Gln Gly Trp
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Gly Ser Ile Thr
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<210> 74
<211> 20

Substitute_SequenceListing

<212> PRT
<213> Artificial Sequence

<220>
<223> HCV464-483

<400> 74

Lys Phe Ala Gln Gly Trp Gly Ser Ile Thr Tyr Ala Glu Ser Gly Gly
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Ser Asp Gln Arg
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<210> 75
<211> 20
<212> PRT
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<220>
<223> HCV474-493

<400> 75

Tyr Ala Glu Ser Gly Gly Ser Asp Gln Arg Pro Tyr Cys Trp His Tyr
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Ala Pro Arg Gln
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<210> 76
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<212> PRT
<213> Artificial Sequence

<220>
<223> HCV484-503

<400> 76

Pro Tyr Cys Trp His Tyr Ala Pro Arg Gln Cys Gly Ile Val Pro Ala
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Ser Gln Val Cys
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<210> 77
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV494-513

<400> 77

Cys Gly Ile Val Pro Ala Ser Gln Val Cys Gly Pro Val Tyr Cys Phe
Page 24

Substitute_SequenceListing

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Thr Pro Ser Pro
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<210> 78
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV504-523

<400> 78

Gly Pro Val Tyr Cys Phe Thr Pro Ser Pro Val Val Val Gly Thr Thr
1 5 10 15

Asp Arg Ser Gly
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<210> 79
<211> 20
<212> PRT
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<220>
<223> HCV514-533

<400> 79

Val Val Val Gly Thr Thr Asp Arg Ser Gly Ala Pro Thr Tyr Thr Trp
1 5 10 15

Gly Glu Asn Glu
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<210> 80
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV524-543

<400> 80

Ala Pro Thr Tyr Thr Trp Gly Glu Asn Glu Thr Asp Val Leu Leu Leu
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Asn Asn Thr Arg
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<210> 81
<211> 20

Substitute_SequenceListing

<212> PRT
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<220>
<223> HCV534-553

<400> 81

Thr Asp Val Leu Leu Leu Asn Asn Thr Arg Pro Pro Gln Ala Asn Trp
1 5 10 15

Phe Gly Cys Thr
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<210> 82
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<212> PRT
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<223> HCV544-563

<400> 82

Pro Pro Gln Ala Asn Trp Phe Gly Cys Thr Trp Met Asn Ser Thr Gly
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Phe Thr Lys Thr
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<210> 83
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<212> PRT
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<220>
<223> HCV554-573

<400> 83

Trp Met Asn Ser Thr Gly Phe Thr Lys Thr Cys Gly Gly Pro Pro Cys
1 5 10 15

Asp Ile Gly Gly
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<210> 84
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV564-583

<400> 84

Cys Gly Gly Pro Pro Cys Asp Ile Gly Gly Val Gly Asn Asn Thr Leu
Page 26

Substitute_SequenceListing

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Thr Cys Pro Thr
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<210> 85
<211> 20
<212> PRT
<213> Artificial Sequence

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<223> HCV574-593

<400> 85

Val Gly Asn Asn Thr Leu Thr Cys Pro Thr Asp Cys Phe Arg Lys His
1              5              10              15

Pro Glu Ala Thr
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<210> 86
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<212> PRT
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<223> HCV584-603

<400> 86

Asp Cys Phe Arg Lys His Pro Glu Ala Thr Tyr Thr Lys Cys Gly Ser
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Gly Pro Trp Leu
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<210> 87
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<212> PRT
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<223> HCV594-613

<400> 87

Tyr Thr Lys Cys Gly Ser Gly Pro Trp Leu Thr Pro Arg Cys Met Val
1              5              10              15

Asp Tyr Pro Tyr
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<210> 88
<211> 20

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Substitute_SequenceListing

<212> PRT
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<220>
<223> HCV604-623

<400> 88

Thr Pro Arg Cys Met Val Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro
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Cys Thr Ile Asn
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<210> 89
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV614-633

<400> 89

Arg Leu Trp His Tyr Pro Cys Thr Ile Asn Phe Thr Ile Phe Lys Val
1 5 10 15

Arg Met Tyr Val
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<210> 90
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<212> PRT
<213> Artificial Sequence

<220>
<223> HCV624-643

<400> 90

Phe Thr Ile Phe Lys Val Arg Met Tyr Val Gly Gly Val Glu His Arg
1 5 10 15

Leu Asp Ala Ala
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<210> 91
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV634-653

<400> 91

Gly Gly Val Glu His Arg Leu Asp Ala Ala Cys Asn Trp Thr Arg Gly
Page 28

Substitute_SequenceListing

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Glu Arg Cys Asp
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<210> 92
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV644-663

<400> 92

Cys Asn Trp Thr Arg Gly Glu Arg Cys Asp Leu Glu Asp Arg Asp Arg
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Ser Glu Leu Ser
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<210> 93
<211> 20
<212> PRT
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<220>
<223> HCV654-673

<400> 93

Leu Glu Asp Arg Asp Arg Ser Glu Leu Ser Pro Leu Leu Leu Ser Thr
1 5 10 15

Thr Glu Trp Gln
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<210> 94
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<212> PRT
<213> Artificial Sequence

<220>
<223> HCV664-683

<400> 94

Pro Leu Leu Leu Ser Thr Thr Glu Trp Gln Val Leu Pro Cys Ser Phe
1 5 10 15

Thr Thr Leu Pro
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<210> 95
<211> 20

Substitute_SequenceListing

<212> PRT
<213> Artificial Sequence

<220>
<223> HCV674-693

<400> 95

Val Leu Pro Cys Ser Phe Thr Thr Leu Pro Ala Leu Ser Thr Gly Leu
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Ile His Leu His
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<210> 96
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV684-703

<400> 96

Ala Leu Ser Thr Gly Leu Ile His Leu His Gln Asn Ile Val His Ala
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Gln His Leu His
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<210> 97
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV694-713

<400> 97

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Val Ser Ile Val
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<210> 98
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1029

<400> 98

Ile Thr Ala Tyr Ser Gln Gln Thr Arg Gly Leu Leu Gly Cys Ile Ile
Page 30

Substitute_SequenceListing

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Thr Ser Leu Thr
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<210> 99
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<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1039

<400> 99

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Val Glu Gly Glu
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<212> PRT
<213> Artificial Sequence

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<223> gHCV-1069

<400> 100

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Gly Ser Lys

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<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1078

<400> 101

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Gly Pro Ile Thr
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<210> 102
<211> 20

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Substitute_SequenceListing

<212> PRT
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Asp Leu Asp Leu
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<210> 103
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1098

<400> 103

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Pro Gly Ser Arg
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<210> 104
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<212> PRT
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<220>
<223> gHCV-1108

<400> 104

Val Gly Trp Gln Ala Pro Pro Gly Ser Arg Pro Leu Thr Pro Cys Thr
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Cys Gly Ser Ser
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<210> 105
<211> 20
<212> PRT
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<220>
<223> gHCV-1118

<400> 105

Pro Leu Thr Pro Cys Thr Cys Gly Ser Ser Asp Leu Tyr Leu Val Thr
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Substitute_SequenceListing

1 5 10 15

Arg His Ala Asp
20

<210> 106
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1128

<400> 106

Asp Leu Tyr Leu Val Thr Arg His Ala Asp Val Ile Pro Val Arg Arg
1 5 10 15

Arg Gly Asp Ser
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<210> 107
<211> 20
<212> PRT
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<223> gHCV-1138

<400> 107

Val Ile Pro Val Arg Arg Arg Gly Asp Ser Arg Gly Ser Leu Pro Cys
1 5 10 15

Pro Arg Pro Val
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<210> 108
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1148

<400> 108

Arg Gly Ser Leu Pro Cys Pro Arg Pro Val Ser Tyr Leu Lys Gly Ser
1 5 10 15

Ser Gly Gly Pro
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<210> 109
<211> 20

Substitute_SequenceListing

<212> PRT
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<400> 109

Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu Leu Cys Pro Ser Gly
1 5 10 15

His Ala Val Gly
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<210> 110
<211> 20
<212> PRT
<213> Artificial Sequence

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<400> 110

Leu Leu Cys Pro Ser Gly His Ala Val Gly Ile Phe Arg Ala Ala Val
1 5 10 15

Cys Thr Arg Gly
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<210> 111
<211> 20
<212> PRT
<213> Artificial Sequence

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<223> gHCV-1178

<400> 111

Ile Phe Arg Ala Ala Val Cys Thr Arg Gly Val Ala Lys Ala Val Asp
1 5 10 15

Phe Ile Pro Val
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<210> 112
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1188

<400> 112

Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Ser Met Glu Thr Thr
Page 34

Substitute_SequenceListing

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1              5              10              15

Met Arg Ser Pro
20

<210> 113
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<212> PRT
<213> Artificial Sequence

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<223> gHCV-1198

<400> 113

Glu Ser Met Glu Thr Thr Met Arg Ser Pro Val Phe Thr Asp Asn Ser
1              5              10              15

Thr Pro Pro Ala
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<210> 114
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<400> 114

Val Phe Thr Asp Asn Ser Thr Pro Pro Ala Val Pro Gln Thr Phe Gln
1              5              10              15

Val Ala His Leu
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<210> 115
<211> 20
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<213> Artificial Sequence

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<223> HCV1218-1237

<400> 115

Val Pro Gln Thr Phe Gln Val Ala His Leu His Ala Pro Thr Gly Ser
1              5              10              15

Gly Lys Ser Thr
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<210> 116
<211> 20

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Substitute_SequenceListing

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<400> 116

His Ala Pro Thr Gly Ser Gly Lys Ser Thr Lys Val Pro Ala Ala Tyr
1 5 10 15

Ala Ala Gln Gly
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<210> 117
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<212> PRT
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<220>
<223> HCV1238-1257

<400> 117

Lys Val Pro Ala Ala Tyr Ala Ala Gln Gly Tyr Lys Val Leu Val Leu
1 5 10 15

Asn Pro Ser Val
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<210> 118
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<213> Artificial Sequence

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<223> HCV1248-1267

<400> 118

Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Leu Gly Phe
1 5 10 15

Gly Val Tyr Met
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<210> 119
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1258-1277

<400> 119

Ala Ala Thr Leu Gly Phe Gly Val Tyr Met Ser Lys Ala His Gly Ile
Page 36

Substitute_SequenceListing

1 5 10 15

Asp Pro Asn Ile
20

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<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1268-1287

<400> 120

Ser Lys Ala His Gly Ile Asp Pro Asn Ile Arg Thr Gly Val Arg Ala
1 5 10 15

Ile Thr Thr Gly
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<210> 121
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1278-1297

<400> 121

Arg Thr Gly Val Arg Ala Ile Thr Thr Gly Ala Pro Ile Thr Tyr Ser
1 5 10 15

Thr Tyr Gly Lys
20

<210> 122
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1318-1337

<400> 122

His Ser Thr Asp Ser Thr Ser Ile Leu Gly Ile Gly Thr Val Leu Asp
1 5 10 15

Gln Ala Glu Thr
20

<210> 123
<211> 20

Substitute_SequenceListing

<212> PRT
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<400> 123

Ile Gly Thr Val Leu Asp Gln Ala Glu Thr Ala Gly Ala Arg Leu Val
1 5 10 15

Val Leu Ala Thr
20

<210> 124
<211> 20
<212> PRT
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<223> HCV1348-1367

<400> 124

Ala Thr Pro Pro Gly Ser Val Thr Val Pro His Pro Asn Ile Glu Glu
1 5 10 15

Val Ala Leu Ser
20

<210> 125
<211> 20
<212> PRT
<213> Artificial Sequence

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<223> HCV1358-1377

<400> 125

His Pro Asn Ile Glu Glu Val Ala Leu Ser Asn Thr Gly Glu Ile Pro
1 5 10 15

Phe Tyr Gly Lys
20

<210> 126
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1368-1387

<400> 126

Asn Thr Gly Glu Ile Pro Phe Tyr Gly Lys Ala Ile Pro Ile Glu Val
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Substitute_SequenceListing

1 5 10 15

Ile Lys Gly Gly
20

<210> 127
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1388-1407

<400> 127

Arg His Leu Ile Phe Cys His Ser Lys Lys Lys Ser Asp Glu Leu Ala
1 5 10 15

Ala Lys Leu Ser
20

<210> 128
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1398-1417

<400> 128

Lys Ser Asp Glu Leu Ala Ala Lys Leu Ser Ala Leu Gly Leu Asn Ala
1 5 10 15

Val Ala Tyr Tyr
20

<210> 129
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1408-1427

<400> 129

Ala Leu Gly Leu Asn Ala Val Ala Tyr Tyr Arg Gly Leu Asp Val Ser
1 5 10 15

Val Ile Pro Thr
20

<210> 130
<211> 20

Substitute_SequenceListing

<212> PRT
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<220>
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<400> 130

Arg Gly Leu Asp Val Ser Val Ile Pro Thr Ser Gly Asp Val Val Val
1 5 10 15

Val Ala Thr Asp
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<210> 131
<211> 20
<212> PRT
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<220>
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<400> 131

Thr Gln Thr Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile Asp Thr
1 5 10 15

Thr Thr Val Pro
20

<210> 132
<211> 20
<212> PRT
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<220>
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<400> 132

Thr Phe Thr Ile Asp Thr Thr Thr Val Pro Gln Asp Ala Val Ser Arg
1 5 10 15

Ser Gln Arg Arg
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<210> 133
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1478-1497

<400> 133

Gln Asp Ala Val Ser Arg Ser Gln Arg Arg Gly Arg Thr Gly Arg Gly
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Substitute_SequenceListing

1 5 10 15

Arg Arg Gly Ile
20

<210> 134
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1488-1507

<400> 134

Gly Arg Thr Gly Arg Gly Arg Arg Gly Ile Tyr Arg Phe Val Thr Pro
1 5 10 15

Gly Glu Arg Pro
20

<210> 135
<211> 20
<212> PRT
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<220>
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<400> 135

Tyr Arg Phe Val Thr Pro Gly Glu Arg Pro Ser Gly Met Phe Asp Ser
1 5 10 15

Ser Val Leu Cys
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<210> 136
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<212> PRT
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<223> HCV1518-1537

<400> 136

Glu Cys Tyr Asp Ala Gly Cys Ala Trp Tyr Glu Leu Thr Pro Ala Glu
1 5 10 15

Thr Ser Val Arg
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<210> 137
<211> 20

Substitute_SequenceListing

<212> PRT
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<400> 137

Glu Leu Thr Pro Ala Glu Thr Ser Val Arg Leu Arg Ala Tyr Leu Asn
1 5 10 15

Thr Pro Gly Leu
20

<210> 138
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1538-1557

<400> 138

Leu Arg Ala Tyr Leu Asn Thr Pro Gly Leu Pro Val Cys Gln Asp His
1 5 10 15

Leu Glu Phe Trp
20

<210> 139
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1548-1567

<400> 139

Pro Val Cys Gln Asp His Leu Glu Phe Trp Glu Ser Val Phe Thr Gly
1 5 10 15

Leu Thr His Ile
20

<210> 140
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1558-1577

<400> 140

Glu Ser Val Phe Thr Gly Leu Thr His Ile Asp Ala His Phe Leu Ser
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Substitute_SequenceListing

1 5 10 15

Gln Thr Lys Gln
20

<210> 141
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1568-1587

<400> 141

Asp Ala His Phe Leu Ser Gln Thr Lys Gln Ala Gly Asp Asn Phe Pro
1 5 10 15

Tyr Leu Val Ala
20

<210> 142
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1578-1597

<400> 142

Ala Gly Asp Asn Phe Pro Tyr Leu Val Ala Tyr Gln Ala Thr Val Cys
1 5 10 15

Ala Arg Ala Gln
20

<210> 143
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1588-1607

<400> 143

Tyr Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro Pro Ser Trp
1 5 10 15

Asp Gln Met Trp
20

<210> 144
<211> 20

Substitute_SequenceListing

<212> PRT
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<220>
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<400> 144

Ala Pro Pro Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Thr Arg Leu
1 5 10 15

Lys Pro Thr Leu
20

<210> 145
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1608-1627

<400> 145

Lys Cys Leu Thr Arg Leu Lys Pro Thr Leu His Gly Pro Thr Pro Leu
1 5 10 15

Leu Tyr Arg Leu
20

<210> 146
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1618-1637

<400> 146

His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn Glu
1 5 10 15

Val Thr Leu Thr
20

<210> 147
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> HCV1628-1647

<400> 147

Gly Ala Val Gln Asn Glu Val Thr Leu Thr His Pro Val Thr Lys Phe
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Substitute_SequenceListing

1 5 10 15

Ile Met Ala Cys
20

<210> 148
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1972

<400> 148

Ser Gly Ser Trp Leu Arg Asp Val Trp Asp Trp Ile Cys Thr Val Leu
1 5 10 15

Thr Asp Phe Lys
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<210> 149
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1982

<400> 149

Trp Ile Cys Thr Val Leu Thr Asp Phe Lys Thr Trp Leu Gln Ser Lys
1 5 10 15

Leu Leu Pro Arg
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<210> 150
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<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-1992

<400> 150

Thr Trp Leu Gln Ser Lys Leu Leu Pro Arg Leu Pro Gly Val Pro Phe
1 5 10 15

Phe Ser Cys Gln
20

<210> 151
<211> 20

Substitute_SequenceListing

<212> PRT
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<220>
<223> gHCV-2002

<400> 151

Leu Pro Gly Val Pro Phe Phe Ser Cys Gln Arg Gly Tyr Lys Gly Val
1 5 10 15

Trp Arg Gly Glu
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<210> 152
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<212> PRT
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<220>
<223> gHCV-2012

<400> 152

Arg Gly Tyr Lys Gly Val Trp Arg Gly Glu Gly Ile Met Gln Thr Thr
1 5 10 15

Cys Pro Cys Gly
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<210> 153
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2022

<400> 153

Gly Ile Met Gln Thr Thr Cys Pro Cys Gly Ala Gln Ile Ala Gly His
1 5 10 15

Val Lys Asn Gly
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<210> 154
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2042

<400> 154

Ser Met Arg Ile Val Gly Pro Arg Thr Cys Ser Asn Thr Trp His Gly
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Substitute_SequenceListing

```

1              5              10              15

Thr Phe Pro Ile
20

<210> 155
<211> 20
<212> PRT
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<220>
<223> gHCV-2052

<400> 155

Ser Asn Thr Trp His Gly Thr Phe Pro Ile Asn Ala Tyr Thr Thr Gly
1              5              10              15

Pro Cys Ser Pro
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<210> 156
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<220>
<223> gHCV-2062

<400> 156

Asn Ala Tyr Thr Thr Gly Pro Cys Ser Pro Ser Pro Ala Pro Asn Tyr
1              5              10              15

Ser Arg Ala Leu
20

<210> 157
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2072

<400> 157

Ser Pro Ala Pro Asn Tyr Ser Arg Ala Leu Trp Arg Val Ala Ala Glu
1              5              10              15

Glu Tyr Val Glu
20

<210> 158
<211> 20

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Substitute_SequenceListing

<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2082

<400> 158

Trp Arg Val Ala Ala Glu Glu Tyr Val Glu Val Thr Arg Val Gly Asp
1 5 10 15

Phe His Tyr Val
20

<210> 159
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2092

<400> 159

Val Thr Arg Val Gly Asp Phe His Tyr Val Thr Gly Val Thr Thr Asp
1 5 10 15

Asn Val Lys Cys
20

<210> 160
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2102

<400> 160

Thr Gly Val Thr Thr Asp Asn Val Lys Cys Pro Cys Gln Val Pro Ala
1 5 10 15

Pro Glu Phe Phe
20

<210> 161
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2122

<400> 161

Thr Glu Leu Asp Gly Val Arg Leu His Arg Tyr Ala Pro Ala Cys Lys
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Substitute_SequenceListing

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1                5                10                15

Pro Leu Leu Arg
20

<210> 162
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
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<400> 162

Tyr Ala Pro Ala Cys Lys Pro Leu Leu Arg Asp Glu Val Ser Phe Gln
1                5                10                15

Val Gly Leu Asn
20

<210> 163
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2152

<400> 163

Gln Tyr Leu Val Gly Ser Gln Leu Pro Cys Glu Pro Glu Pro Asp Val
1                5                10                15

Ala Val Leu Thr
20

<210> 164
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2162

<400> 164

Glu Pro Glu Pro Asp Val Ala Val Leu Thr Ser Met Leu Thr Asp Pro
1                5                10                15

Ser His Ile Thr
20

<210> 165
<211> 20

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Substitute_SequenceListing

<212> PRT
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<220>
<223> gHCV-2172

<400> 165

Ser Met Leu Thr Asp Pro Ser His Ile Thr Ala Glu Thr Ala Lys Arg
1 5 10 15

Arg Leu Ala Arg
20

<210> 166
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2182

<400> 166

Ala Glu Thr Ala Lys Arg Arg Leu Ala Arg Gly Ser Pro Pro Ser Leu
1 5 10 15

Ala Ser Ser Ser
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<210> 167
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2192

<400> 167

Gly Ser Pro Pro Ser Leu Ala Ser Ser Ser Ala Ser Gln Leu Ser Ala
1 5 10 15

Pro Ser Leu Lys
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<210> 168
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2202

<400> 168

Ala Ser Gln Leu Ser Ala Pro Ser Leu Lys Ala Thr Cys Thr Ile His
Page 50

Substitute_SequenceListing

1 5 10 15

His Asp Ser Pro
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<210> 169
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2212

<400> 169

Ala Thr Cys Thr Ile His His Asp Ser Pro Asp Ala Asp Leu Ile Glu
1 5 10 15

Ala Asn Leu Leu
20

<210> 170
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2222

<400> 170

Asp Ala Asp Leu Ile Glu Ala Asn Leu Leu Trp Arg Gln Glu Met Gly
1 5 10 15

Gly Asn Ile Thr
20

<210> 171
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
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<400> 171

Trp Arg Gln Glu Met Gly Gly Asn Ile Thr Arg Val Glu Ser Glu Asn
1 5 10 15

Lys Val Val Ile
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<210> 172
<211> 20

Substitute_SequenceListing

<212> PRT
<213> Artificial Sequence

<220>
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<400> 172

Arg Val Glu Ser Glu Asn Lys Val Val Ile Leu Asp Ser Phe Glu Pro
1 5 10 15

Ile Arg Ala Glu
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<210> 173
<211> 20
<212> PRT
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<220>
<223> gHCV-2252

<400> 173

Leu Asp Ser Phe Glu Pro Ile Arg Ala Glu Glu Asp Glu Arg Glu Val
1 5 10 15

Ser Val Pro Ala
20

<210> 174
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2262

<400> 174

Glu Asp Glu Arg Glu Val Ser Val Pro Ala Glu Ile Leu Arg Arg Ser
1 5 10 15

Arg Lys Phe Pro
20

<210> 175
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2272

<400> 175

Glu Ile Leu Arg Arg Ser Arg Lys Phe Pro Ala Ala Met Pro Ile Trp
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Substitute_SequenceListing

1 5 10 15

Ala Arg Pro Asp
20

<210> 176
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2292

<400> 176

Tyr Asn Pro Pro Leu Leu Glu Ser Trp Lys Asp Pro Asp Tyr Val Pro
1 5 10 15

Pro Val Val His
20

<210> 177
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2302

<400> 177

Asp Pro Asp Tyr Val Pro Pro Val Val His Gly Cys Pro Leu Pro Pro
1 5 10 15

Thr Lys Ala Ala
20

<210> 178
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2322

<400> 178

Pro Ile Pro Pro Pro Arg Arg Lys Arg Thr Ile Val Leu Thr Glu Ser
1 5 10 15

Thr Val Ser Ser
20

<210> 179
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Substitute_SequenceListing

<212> PRT
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 <400> 179
 Ile Val Leu Thr Glu Ser Thr Val Ser Ser Ala Leu Ala Glu Leu Ala
 1 5 10 15

Thr Lys Thr Phe
 20

<210> 180
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 <212> PRT
 <213> Artificial Sequence

<220>
 <223> gHCV-2342
 <400> 180

Ala Leu Ala Glu Leu Ala Thr Lys Thr Phe Gly Gly Ser Gly Ser Trp
 1 5 10 15

Ala Ala Asp Ser
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<210> 181
 <211> 20
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> gHCV-2352
 <400> 181

Gly Gly Ser Gly Ser Trp Ala Ala Asp Ser Gly Thr Ala Thr Ala Pro
 1 5 10 15

Pro Asp Gln Thr
 20

<210> 182
 <211> 20
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> gHCV-2372
 <400> 182

Ser Asp Asp Gly Asp Lys Glu Ser Asp Val Glu Ser Tyr Ser Ser Met
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Substitute_SequenceListing

1 5 10 15

Pro Pro Leu Glu
20

<210> 183
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2382

<400> 183

Glu Ser Tyr Ser Ser Met Pro Pro Leu Glu Gly Glu Pro Gly Asp Pro
1 5 10 15

Asp Leu Ser Asp
20

<210> 184
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> gHCV-2392

<400> 184

Gly Glu Pro Gly Asp Pro Asp Leu Ser Asp Gly Ser Trp Ser Thr Val
1 5 10 15

Ser Glu Glu Ala
20